

CLAIMS

What is claimed:

1. A system for determining and monitoring contamination in a photolithography instrument, comprising at least one collection device in fluid communication
5 with a gas flow extending through an optical system of the tool, the collection device having an adsorptive material and a saturation capacity, the collection device being operated past the saturation capacity to adsorb contaminants in the gas flow.
- 10 2. The system of Claim 1, wherein the adsorptive material comprises glass spheres having predetermined surface properties for adsorption of contaminants.
3. The system of Claim 1, wherein the collection device is tubular.
- 15 4. The system of Claim 1, further comprising a collection device that is not in fluid communication with the gas flow.
5. The system of Claim 1, wherein the collection device is at least one of glass and coated glass material.
- 20 6. The system of Claim 1, wherein the adsorptive material comprises the polymer Tenax[®].
7. The system of Claim 1, wherein the contamination includes at least one of
25 refractory compounds, high molecular weight compounds and low molecule weight compounds.

8. A contamination analysis apparatus in a photolithography system having an optical element comprising:
a collection device comprising a material having a surface property of the optical element coupled to a gas source, the collection device being coupled to a light source and having an adsorptive material and operated past a saturation capacity to adsorb contaminants.
9. The contamination analysis apparatus of Claim 8, wherein the adsorptive material comprises a polymer such as Tenax[®].
10. The contamination analysis apparatus of Claim 8, wherein the adsorptive material comprises glass spheres.
11. The contamination analysis apparatus of Claim 8, wherein the contaminants include at least one of refractory compounds, high molecular weight compounds and low molecular weight compounds.
12. A method for removing contaminants in a semiconductor processing system, comprising the steps of:
delivering a gas stream from the semiconductor processing system to a collection device, the processing system having an optical system; and
collecting contaminants from the gas stream in the collection device for a duration exceeding a saturation capacity of the collection device.
13. A method for monitoring and removing of contaminants in a photolithography system having an optical path, comprising the steps of:
delivering a gas stream from a photolithography system to a collection device;
detecting contaminants from the gas stream with the collection device;

analyzing contaminants; and

actuating a membrane to remove contaminants from the optical path.

14. The method of Claim 13, wherein the contamination includes at least one of
5 refractory compounds, high molecular weight compounds and low molecular weight compounds.
15. A filtering system for removing contamination in a semiconductor processing system, comprising at least one collection device in fluid communication with a
10 gas flow extending through an optical system of the semiconductor processing system, at least one collection device having a selectively permeable membrane that filters contaminants such as at least one of a refractory compound, a high molecular weight compound and a low molecular weight compound from the gas flow.
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16. The filtering system of Claim 15, wherein the collection device is coupled to a vacuum source to increase a pressure gradient across the selective membrane.
17. The filtering system of Claim 15, wherein the gas flow comprises clean dry air,
20 nitrogen, and/or other inert gases.
18. The filtering system of Claim 15, further comprising a regenerative adsorption device in fluid communication with an output permeate stream from the selectively permeable membrane.
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19. The filtering system of Claim 15, further comprising a second collection device in fluid communication with a residue stream of the collection device, the second collection device having a second membrane that is selectively permeable to oxygen and water.

20. A method for cleaning a contaminated surface in a semiconductor processing system, comprising the steps of:
- 5 delivering a gas stream to the contaminated surface in the processing system in the presence of light, the gas stream having an additive gas and the gas stream combining with a contaminant on the contaminated surface to form a volatile product; and
- removing the volatile product from the processing system.
- 10 21. The method for cleaning of Claim 20, wherein the step of removing the volatile product includes using a purge gas.
22. The method of cleaning of Claim 20, wherein steps of delivering a gas stream to the contaminated surface further comprises delivering a gas stream to an optical
- 15 system surface.
23. The method of Claim 21 wherein the step of removing further comprising filtering the volatile product from the gas stream with a filter.
- 20 24. The method of Claim 21 further comprising monitoring a concentration of the volatile product.